

5 An emitter has an electron supply layer and a tunneling layer formed on the electron supply layer. Optionally, an insulator layer is formed on the electron supply layer and has openings defined within in which the tunneling layer is formed. A cathode layer is formed on the tunneling layer to provide a surface for energy emissions of electrons and/or photons. Preferably, the emitter is subjected to an annealing process thereby increasing the supply of
10 electrons tunneled from the electron supply layer to the cathode layer.